REMARKS

The Office Action dated June 24, 2009 has been received and carefully noted. The above amendments and following remarks are being submitted as a full and complete response thereto.

Claims 1-4, 6-7, 10-18 and 21-29 are pending. By this Preliminary Amendment, Claims 1, 3-4, 6-7, 10 and 13-14 are amended and Claim 29 is added. Support for the amendments to the claims may be found in the application as originally filed. Applicants respectfully submit that no new subject matter is presented herein.

Claim Rejections -- 35 U.S.C. § 112

Claims 6 and 10 are rejected under 35 U.S.C. § 112, second paragraph, for containing terms that render the claims indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully submit that Claims 6 and 10 have been amended in a manner believed to be responsive to the rejection. Accordingly, Applicants respectfully request withdrawal of the rejection.

Claim Rejections -- 35 U.S.C. § 103

Claims 1-2, 7 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,850,288 to Hoffert et al. ('288) in view of U.S. Patent No. 5,326,254 to Munk ('254). Claims 3-4, 6 and 12-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over '288 in view of '254 as applied to claims 1-2, and further in view of U.S. Patent No. 6,848,375 to Kasin ('375). Claim 11 is rejected under 35 U.S.C. § 103(a) as being unpatentable over '288 in view of '254 as applied to

claims 1-2, and further in view of U.S. Patent No. 4,022,591 to Staudinger ('591). Claims 14, 16, 18, 21-23 and 28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over '288 in view of '254, and further in view of U.S. Patent No. 6,883,443 to Rettig et al. ('443). Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over '288 in view of U.S. Patent No. 6,145,452 to Heger et al. ('452). Claims 17 and 27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over '288 in view of '254 as applied to claim 16, and further in view of '375. Claims 24-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over '288 in view of '591. Applicants respectfully traverse the rejections.

Claims 1 and 14 similarly recite a method and an apparatus, respectively, for the treatment of materials that includes, among other steps and features, supplying a material to be treated and a combustion supporter including oxygen and recycled gases into an oxidation chamber or combustion reactor, and discharging gases produced during the oxidation or combustion of the material from the oxidation chamber or combustion reactor, wherein the material to be treated and the products resulting from the oxidation or combustion are subjected to conditions of isothermy or quasi-isothermy at high or very high temperature, without substantial oxygen deficit, in any part of the chamber or reactor.

'288 discloses a pressurized cyclonic combustion method and a cylindrical burner apparatus for the pressurized combustion of particulate solid fuels to produce a pressurized clean effluent gas. The burner includes a primary combustion chamber 15 and a secondary combustion chamber 25 separated by a choke 20. Air is supplied tangententially at high velocity through multiple ports spaced along the primary

combustion chamber 15 to produce high centrifugal forces on the particulate solids introduced into the chamber 15. A quench gas stream is introduced into the choke zone to reduce the temperature of the hot effluent gas leaving the primary combustion chamber.

As admitted by the Office Action on page 4, paragraph 8, "'288 fails to disclose recycled gases being supplied to the combustion reactor or water being injected into the recycled gases to raise the concentration of water in the recycled gases." The Applicants respectfully submit that '288 also does not teach or suggest that the material to be treated and the products resulting from the combustion are subjected to conditions of isothermy or quasi-isothermy at high or very high temperature, without substantial oxygen deficit, in any part of the reactor.

'288 discloses a reactor which is divided into two chambers, with the secondary chamber 25 downstream of the primary chamber 15. A quenching gas is introduced between the two chambers to reduce the temperature of the effluent gas in the secondary chamber prior to the effluent gas exiting the reactor. '288 is related to the burning of solid fuel particles, wherein the solid fuel particles are retained for very long periods in the cylindrical combustion chamber 15, which has an aspect ratio of longitudinal length more than about twice that of the chamber inside diameter. Into this combustion chamber 15, the particulate solid fuel is introduced tangentially through opening 16 in lean phase transport near the inlet end (col. 2, lines 18-26, col. 5, lines 62-66)). The extended combustion path of the fuel particles is significantly prolonged by injecting combustion air along the longitudinal axis of the burner 15 at a high velocity (col. 2, lines 42-45) through multiple tangential inlet openings 18a, 18b, 18e, for

example, provided through casing 12 and lining 14 and spaced apart along the length of the burner 15 (col. 6, lines 11-13). The hot pressurized effluent gas produced in the primary combustion zone in the burner 15 is usually at temperatures of about 2100°-2800°F (col. 4, lines 21-23).

Downstream from the choke 20, the secondary cylindrical combustion chamber 25 is connected pressure-tightly to the outer casing of the primary combustion chamber 15 (col. 4, lines 62-65). In the combustion chamber 25, the temperature is 1400° - 2000°F or 1500° - 1800°F (col. 8, line 18). About 25% of the total combustion may occur in the secondary chamber 25 (col. 7, lines 40-43). A quench gas such as additional pressurized air or steam is provided into secondary chamber 25 through at least one opening 30 through refractory 24, located immediately downstream from the choke 20 (col. 8, lines 1-4). As such, '288 teaches a burner that includes two combustion chambers, a primary combustion chamber 15 and a secondary combustion chamber 25, working at different temperatures. As such, '288 does not teach or suggest, and actually teaches away from, the materials to be treated and the products resulting from combustion being subjected to conditions of isothermy or quasi-isothermy in any part of the reactor, as recited in Claims 1 and 14.

The Office Action on page 4, paragraph 8, asserts that '254 cures the deficiencies of '288 with respect to "recycling flue gases to a combustion chamber." '254 discloses a burner-containing apparatus which has a flue gas recirculation system for recirculating a portion of the flue gases back to an input of the burner for reducing noxious emissions without undue sacrifice of flame stability and/or burner efficiency (col.

1, lines 57-60). A fogging device, which produces a fog from a fogger water supply and a fogger air supply, may be used to humidify the recirculated flue gases.

The Applicants respectfully note that one of ordinary skill in the art would not be motivated to modify '288 according to the teachings of '254, as indicated by the Office Action. As noted above, the Office Action arbitrarily selects the combustion chamber 15 inside the burner apparatus of '288 to correspond to the combustion reactor recited in Claims 1 and 14, discarding entirely the secondary chamber 25. '288 clearly states as a primary purpose the use of secondary chamber 25 to improve combustion and control temperature of the produced effluent gases (emphasis added, see Col. 1, lines 24-26). Moreover, as shown in Figs. 1 and 6 of '288, no effluent gases are discharged from the combustion reactor after the primary combustion chamber 15. The combustion gases from the primary combustion chamber 15 pass into the secondary combustion chamber 25 (col. 4, lines 62-65). As such, one of ordinary skill in the art would never look to modify '288 according to the teachings of '254, as recycling the effluent gases leaving the primary combustion chamber 15, prior to processing through secondary combustion chamber 25, defeats a stated purpose of the primary reference '288. The improved combustion and control temperatures of the produced effluent gases as a result of the secondary combustion chamber 25 would never be realized.

Moreover, the Office Action, page 4, section 8, states as a motivation for the combination of '288 and '254 that "such a combination would have produced the added benefit of reduced NOx emissions and a more efficient combustion process." Col. 1, lines 58-60, of '254 states that the reduced NOx emissions are obtained ". . . without undue sacrifice of flame stability and/or burner efficiency." Therefore, the purpose of

'254 is not to improve the combustion efficiency ("without undue sacrifice") of the burner apparatus from the combustion efficiency prior to providing the flue gas recirculation equipment with the fogging device. Accordingly, contrary to the Office Action assertion, there would be no motivation to combine '288 with '254 to have a more efficient combustion process. Furthermore, '254 does not teach or suggest that the material to be treated and the products resulting from the combustion are subjected to conditions of isothermy or quasi-isothermy at high or very high temperature, without substantial oxygen deficit, in any part of the reactor, as recited by Claims 1 and 14.

The Applicants respectfully submit that '375, '591, '443, and '452, whether alone or in combination, also do not teach or suggest supplying a material to be treated and a combustion supporter including oxygen and recycled gases into an oxidation chamber or combustion reactor, and discharging gases produced during the oxidation or combustion of the material from the oxidation chamber or combustion reactor, wherein the material to be treated and the products resulting from the oxidation or combustion are subjected to conditions of isothermy or quasi-isothermy at high or very high temperature, without substantial oxygen deficit, in any part of the chamber or reactor, as recited in Claims 1 and 14.

'375 relates to a method and device for converting energy by combustion of solid fuel, especially incineration of bio-organic fuels and municipal solid waste, to produce heat energy and which operates with very low levels of NO_x, CO and fly ash (col. 1, lines 4-8). As shown in Fig. 2 of '375, the plant includes a primary combustion chamber 1, a secondary combustion chamber 30 with a cyclone, a boiler 40, a gas filter 43, a pipe system for recycling and transportation of flue gas, and a pipe system for supplying

fresh air (col. 5, lines 24-29). Municipal waste in the form of bases 80 (see Fig. 1) is inserted in the air tight fireproof sluice 2, formed by dividing off a section 5 of the upper part of the primary combustion chamber 1 by inserting a removable hatch 7 (col. 5, lines 33-40). The recycled flue gas entering the inlet 3 is taken from the exhaust pipe 50 and transported by a pipe 51. The pipe 51 is equipped with a valve 52. The outlet 4 is connected to a by-pass pipe 54 (col. 5, lines 46-49).

In '375, flue gas particles are removed by sending the unburned solid waste and the gases in counter-flow in the first combustion chamber 1 and, further, by means of the cyclone positioned after the second combustion chamber 30, and at last through the filter 43, wherein also the other pollutants are reduced. '375 uses multiple stages and separate devices to reduce pollutants in the exhausted gas and certainly does not teach or suggest one pressurized isothermal reactor wherein combustion gases admixed with H_2O are recycled, as in the process of the present invention. '375 does not teach or suggest supplying a material to be treated and a combustion supporter including oxygen and recycled gases into an oxidation chamber or combustion reactor, and discharging gases produced during the oxidation or combustion of the material from the oxidation chamber or combustion reactor, wherein the material to be treated and the products resulting from the oxidation or combustion are subjected to conditions of isothermy or quasi-isothermy at high or very high temperature, without substantial oxygen deficit, in any part of the chamber or reactor, as recited by Claims 1 and 14.

'443 discloses improving the efficiency of coal based power generation plants and, in particular, '443 is concerned with the reduction of slogging and fouling at the exit of the coal boiler fire box (col. 1, lines 39-42). Fig. 2 of '443 reports a furnace boiler

system 200, including the furnace 250 that includes the firebox 210 and the upper furnace 220. In the upper furnace 220 the superheater 230 and the preheater 240, respectively, superheats and reheats the steam generated by heating water in the firebox (col. 5, lines 46-55). Flue gas rises up from the firebox 210 into the upper furnace 220 around the superheater 230 and the reheater 240 and out of the furnace to the air preheater 260. The flue gas is then sent through the electrostatic precipitator (ESP) 270. (col. 5, lines 50-59).

Applicants note that that '288 teaches a quench gas can be pressurized air or steam (see Col. 8, lines 1-2). As such, it would not be obvious to one of ordinary skill in the art to modify '288 with a flue gas recirculation system as taught by '443. The Office Action, on page 10, section 21, states that the combination "would have produced the added benefit of an efficient and readily available means of reducing the temperature of the combustion gases to a useable level with the added benefit of not diluting or increasing the volume of the flue gases." However, '443 teaches reducing the slagging and fouling of the surfaces of the waterwalls, firebox, superheater, and reheater of the furnace of a coalfired steam boiler (see Col. 2, lines 8-24). The solution taught by '443 is to reduce the firebox exit temperature to below the specific ash melting temperature by injecting the following substances, either alone or in combination, into ports located in the upper section of the firebox (see Col. 2, lines 13-18): recirculated flue gas from downstream of the electrostatic precipitator, atomized water, or a sorbent slurry. '443 teaches that all of the above materials have a lower temperature than the main flue gas, or they require additional heat for evaporation. The mixing of the materials with the main flue gas from the furnace will not affect the coal combustion process, yet will

reduce the temperature of any fly ash particles in the main flue gas to below the specific ash fusion temperature, and thus, prevent slagging and fouling within the furnace (Col. 2, lines 18-23). The flue gas at the output of the ESP 270 is clean and practically free of fly ash and has cooled down to its lowest temperature in the system (col. 5, lines 60-64). The combustion gases at the output from the reactor in the present invention already contain significantly reduced amounts of flue gas particles. As such, one of ordinary skill in the art would not be motivated to modify the combination of '288 and '254 according to the teachings of '443 since the combination teaches away from the present invention as it concerns to the removal of the fly ash.

'591 is cited for teaching fused clag being cooled and solidified into beads. '452 is cited for teaching walls of a reactor comprising a ceramic lining material. Applicants respectfully submit that '591 and '452 also do not teach or suggest the features of Claims 1 and 14 discussed above.

For at least the reason(s) provided above, Applicants respectfully submit that '288, '254, '375, '591, '443, and '452, alone or by any combination, do not disclose, teach or suggest, and teach away from certain of, the features of the present invention, as recited by Claims 1 and 14. As such, Applicants respectfully submit that one of ordinary skill in the art would not find it obvious to modify '288 according to the teachings of '254, '375, '591, '443, and '452, alone or in combination, because to do so would not arrive at the invention recited by Claims 1 and 14, respectively. Accordingly, Applicants submit that Claims 1 and 14 should be deemed allowable over '288, '254, '375, '591, '443, and '452.

Claims 2-4, 6-7, 10-13, and 28 depend from Claim 1 and Claims 15-18 and 21-27 depend from Claim 14. It is respectfully submitted that these dependent claims are allowable for at least the same reasons that Claims 1 and 14, respectively, are allowable as well as for the additional subject matter recited therein.

Accordingly, Applicants respectfully request withdrawal of the rejections.

New Claim 29

Claim 29 has been added which indirectly depends from independent Claim 1. Applicants respectfully submit that Claim 29 is allowable for at least the same reasons Claim 1 is allowable, as well as for the additional subject matter recited therein.

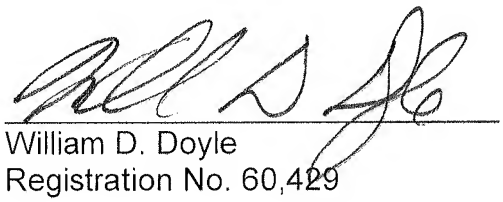
Conclusion

In view of the foregoing, Applicants respectfully request reconsideration of the application, withdrawal of the outstanding objections and rejections, allowance of Claims 1-4, 6-7, 10-18, and 21-29 and the prompt issuance of a Notice of Allowability.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing attorney docket number 108907-00043**.

Respectfully submitted,



William D. Doyle
Registration No. 60,429

Customer No. 004372
ARENT FOX LLP
1050 Connecticut Avenue, N.W., Suite 400
Washington, D.C. 20036-5339
Tel: (202) 857-6000
Fax: (202) 638-4810

WDD:elp